Acadian Redfish − *Sebastes fasciatus*

Overall Vulnerability Rank = Moderate

Biological Sensitivity = Moderate
Climate Exposure = High
Data Quality = 83% of scores ≥ 2

	Sebastes fasciatus	Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Stock Status	2.0	2.8	
	Other Stressors	1.9	2.2	
	Population Growth Rate	3.5	2.4	
	Spawning Cycle	2.6	2.8	
	Complexity in Reproduction	1.9	1.2	
	Early Life History Requirements	2.2	2.0	
	Sensitivity to Ocean Acidification	1.1	0.8	
	Prey Specialization	2.0	3.0	
	Habitat Specialization	1.5	3.0	
	Sensitivity to Temperature	2.2	3.0	
	Adult Mobility	2.8	2.0	
	Dispersal & Early Life History	1.8	2.8	
	Sensitivity Score	Moderate		
Exposure variables	Sea Surface Temperature	3.9	3.0	
	Variability in Sea Surface Temperature	1.0	3.0	
	Salinity	1.1	3.0	
	Variability Salinity	1.2	3.0	
	Air Temperature	1.0	3.0	
	Variability Air Temperature	1.0	3.0	
	Precipitation	1.0	3.0	
	Variability in Precipitation	1.0	3.0	
	Ocean Acidification	4.0	2.0	
	Variability in Ocean Acidification	1.0	2.2	
	Currents	2.1	1.0	
	Sea Level Rise	1.1	1.5	
	Exposure Score	High		
	Overall Vulnerability Rank	Moderate		

Low
Moderate
High
Very High

Acadian Redfish (*Sebastes fasciatus*)

Overall Climate Vulnerability Rank: **Moderate** (94% certainty from bootstrap analysis).

Climate Exposure: **High**. Two exposure factors contributed to this score: Ocean Surface Temperature (3.9) and Ocean Acidification (4.0). All life stages of Acadian Redfish use marine habitats.

Biological Sensitivity: **Moderate**. Three sensitivity attributes scored above 2.5: Population Growth Rate (3.5), Spawning Cycle (2.6), Adult Mobility (2.8). Acadian Redfish are long-lived and slow growing and adults are relatively sedentary and site-attached. Fertilization occurs internally during the late spring (Klein-MacPhee and Collette, 2002).

Distributional Vulnerability Rank: **High** (97% certainty from bootstrap analysis).

Directional Effect in the Northeast U.S. Shelf: The effect of climate change on Acadian Redfish on the Northeast U.S. Shelf is very likely to be negative (>95% certainty in expert scores). Warmer temperatures are associated with a decrease in productivity. In addition, Acadian Redfish is a cold water species and continued warming will likely limit habitat.

Data Quality: 88% of the data quality scores were 2 or greater indicate that data quality is moderate.

Climate Effects on Abundance and Distribution: Working across the Northwest Atlantic, Devine and Haedrich (2011) reported that a mix of exploitation and environmental variability accounted for observed trends in abundance. They also found that the relative importance of exploitation and environment differed among stocks. Population productivity in the Northeast U.S. Shelf is related to climate conditions; recruitment anomalies increase with increasing NAO (Brodziak and O'Brien, 2005). A positive NAO is associated with colder temperatures in the Gulf of Maine (Hare and Kane, 2005). Murawski (1993) and Nye et al. (2009) reported that Acadian Redfish distributions have not changed in response to temperature but have changed in response to population abundance.

Life History Synopsis**:** Acadian Redfish is a long-lived, slow-growing, benthic, marine species occurring from Iceland to Virginia (Klein-MacPhee and Collette, 2002). Acadian Redfish is difficult to separate morphologically from the Deepwater Redfish (*S. mentella*), and so are often treated together (Klein-MacPhee and Collette, 2002). Species of the *Sebastes* genus, including Acadian Redfish, are mature between 5 and 9 years and are fairly unique in being ovoviviparous with a long-duration pelagic phase (Pikanowski et al., 1999; Klein-MacPhee and Collette, 2002). Copulation likely occurs from October to January, fertilization is internal and delayed until February to April, and larvae are released near the end of the yolk-sac stage from April-August (Pikanowski et al., 1999). Larvae and early juveniles of the genus are pelagic (above the thermocline till 25 mm, below the thermocline from 25-50 mm) for 4-5 months (Pikanowski et al., 1999). While pelagic, Acadian Redfish feed during the day on copepods, euphausiids, and fish and invertebrate eggs (Pikanowski et al., 1999). Larger Acadian Redfish and Atlantic Halibut are the main predators of young Acadian Redfish (Pikanowski et al., 1999). Larvae metamorphose by 19 mm standard length and settle to the bottom (25-400 m) at approximately 50 mm standard length (Pikanowski et al., 1999; Klein-MacPhee and Collette, 2002). As adults, Acadian Redfish prefer cool, deepwater habitats (< 13 ^{o}C, 128-592 m), but are also found in Gulf of Maine shoal waters (Pikanowski et al., 1999; Klein-MacPhee and Collette, 2002). While Acadian Redfish probably have no preference for bottom type, they are rarely collected from sandy bottom, may rely on boulders and anemones for cover, and are nearly sessile (Pikanowski et al., 1999). Juveniles and adults of the genus feed on

euphausiids, mysids, and bathypelagic fish at night, rising off the bottom to follow prey (Pikanowski et al., 1999). Predators of redfish include any larger piscivorous fish including Monkfish (Goosefish), Atlantic Cod, Pollock, and Atlantic Wolfish (Pikanowski et al., 1999). Acadian Redfish are managed under the New England Fisheries Management Council's Northeast Multispecies Management Plan and are considered rebuilt, neither overfished nor experiencing overfishing (NEFMC, 2014).

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